

Serial No. 09/821,478
Docket No. FIS9-2000-0192US1

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REMARKS

Entry of this §1.116 Amendment is proper. Since the Amendments above narrow the issues for appeal and since such features and their distinctions over the prior art of record were discussed earlier, such amendments do not raise a new issue requiring a further search and/or consideration by the Examiner. As such, entry of this Amendment is believed proper and Applicant earnestly solicits entry. No new matter has been added.

Claims 1, 3-8, 10-14 and 16-20 are all the claims presently pending in the application. Claims 1, 3-4, 8, 10, 14, 16 and 19-20 have been amended to more clearly define the invention and claims 2, 9 and 15 have been canceled. Claims 1, 8, 14 and 19 are independent.

These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicant also notes that, notwithstanding any claim amendments herein or later during prosecution, Applicant's intent is to encompass equivalents of all claim elements.

Claims 1-20 stand rejected under 35 U.S.C. § 103(a) over Tao et al. (U.S. Patent No. 6,174,818) in view of Ma et al. (U.S. Pat. No. 5,783,101) in further view of Horak et al. (U.S. Pat. 6,297,166).

These rejections are respectfully traversed in the following discussion.

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I. THE CLAIMED INVENTION

The claimed invention is directed to a method of forming a semiconductor device including lithographically patterning a structure having a first critical dimension and etching the structure. The structure includes nested features and an isolated feature. The etching is performed with an O₂-containing material to trim the first critical dimension to a second critical dimension which is smaller than the first critical dimension to correct an offset between the nested features and the isolated feature created during the lithographic patterning.

Conventional semiconductor devices have suffered from nested and isolated feature offset which resulted from the lithographic process which created those features. In other words, conventional lithographic techniques for forming structures have limitations which create an offset between nested and isolated features. For example, lithographic processes have optical properties of light reflection which may adversely affect the isolated/nested offset.

The present invention corrects for the isolated/nested offset from the lithographic formation by etching with an O₂ containing material. Specifically, the present invention controls the etching such that any offset which was caused by a lithographic process is corrected.

II. THE PRIOR ART REJECTION

The Examiner alleges that the Ma et al. reference would have been combined with the Tao et al. reference and further that the Horak et al. reference would have been combined with the combination of the Ma et al. and the Tao et al. references to form the claimed invention. Applicant submits, however, that these references would not have been combined and even if

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combined, the combination would not teach or suggest each and every element of the claimed invention.

Applicant submits that these references would not have been combined as alleged by the Examiner. Indeed, the references are directed to completely different matters and problems.

Specifically, the Tao et al. reference is directed to forming a very narrow polysilicon gate line using a consumable hard mask of silicon oxynitride covered by a thin layer of silicon oxide during the etching of the polysilicon. The Tao et al. reference combines the functions of the ARC function and the substitution of a hard mask during the etching step.

In contrast, the Ma et al. reference is specifically directed to reducing a power frequency in a plasma etch reactor so that the plasma source power level may be increased which provides complete residue removal and prevents etch microloading. Thus, the Tao et al. and Ma et al. references would not have been combined, absent hindsight.

Further, the Horak et al. reference is specifically directed to performing a reactive ion etching process which compensates for a subsequent regular etching process to prevent a nested/isolated feature offset. The Ma et al. reference teaches entirely avoiding any such "profile microloading." Therefore, one of ordinary skill in the art would not have been motivated to modify the teachings of the Ma et al. reference with a reactive ion etching process which compensates for a subsequent etching process as disclosed by the Horak et al. reference because the Ma et al. reference discloses a method which entirely avoids any such problem. Therefore, the references would not have been combined, absent hindsight.

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Further, Applicant submits that the Examiner can point to no motivation or suggestion in the references to urge the combination as alleged by the Examiner. Indeed, the Examiner does not even support the combination by identifying a reason for combining the references.

Even assuming *arguendo* that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each and every element of the claimed invention. The present invention recites etching a structure to correct an offset between isolated and nested structures which were created by a lithographic process. As explained above, this feature is important for correcting offsets which were created as a result of the optical properties of the lithographic process.

The Tao et al. reference does not teach anything at all about isolated/nested offset, let alone any such offsets which are created during lithographic processing. The remaining references do not remedy the deficiencies of the Tao et al. reference.

The Ma et al. reference discloses that "profile microloading" may occur during an etching as a result of etch-by-products of metal and photoresist. The Ma et al. reference explains that polymer residues tend to condense into the sidewalls of the features during the etching process if not removed by the ion bombardment process. Such residue will cause a preference of ions in the nested features so that the etch residues will be thoroughly removed in contrast with isolated features thereby resulting in vertical walls in the nested features while slanted walls are present on the isolated features. The Ma et al. reference discloses a method which prevents such an undesirable "profile microloading." Thus, the Ma et al. reference does not teach or suggest the features of the present invention including etching to compensate for an offset which was

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generated during lithographic process. To the contrary, the Ma et al. reference does not compensate at all for any lithographic offset between nested and isolated features, but instead focuses on the prevention of offset which might be created during an etching.

Similarly, the Horak et al. reference also does not teach or suggest etching to compensate for offset created during lithographic processing. Rather, the Horak et al. reference focuses upon preventing an offset in a subsequent etching process. Therefore, the Horak et al. reference does not teach or suggest compensating for a lithographically created offset.

Indeed, none of the applied references even acknowledge the existence of a lithographically created offset. Therefore, clearly the applied references are incapable of teaching or suggesting compensating for an offset which has not even been recognized.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1, 3-8, 10-14 and 16-20, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

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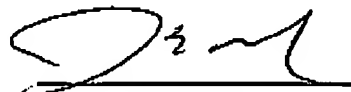
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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Assignee's Deposit Account No. 09-0458.

Respectfully Submitted,

Date:

4/16/03



James E. Howard
Registration No. 39,715

McGinn & Gibb, PLLC
8321 Old Courthouse Rd., Suite 200
Vienna, Virginia 22182
(703) 761-4100
Customer No. 21254

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that I am filing this Amendment Under 37 C.F.R. §1.116 by facsimile with the United States Patent and Trademark Office to Examiner Kripa Sagar, Group Art Unit 1756 at fax number (703) 872-9311 this 16th day of April, 2003.



James E. Howard
Registration No. 39,715

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